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Abstract

We examine the effect of time-varying investment barriers on the pricing of UK closed-end country funds. We find that a direct measure of capital market segmentation is significantly negatively related to both country fund stock return and Net Asset Value (NAV) return of the fund, but there is no relation to the premium. Also we find some evidence of a positive relation for one of our indirect barriers (inflation variability) and price, NAV and premium. Overall our results support an information hypothesis of the impact of investment barriers on closed-end fund pricing.

1. Introduction

Closed-end country funds offer an opportunity for 'stay-at-home' investing abroad. But what happens when investment barriers make foreign investment less accessible? The traditional explanation associated with Bonser-Neal, Brauer, Neal and Wheatley, (1990) is that investment barriers have led to higher premiums[1] as investors are willing to pay more to invest in an otherwise inaccessible market, raising the share price of the fund. However, as we are now in an era of liberalised markets, we suggest that an information hypothesis is more relevant, where investors respond negatively to information about increases in market inaccessibility. We argue that closed-end country fund pricing reflects the information asymmetries between home and foreign investors who are constantly adjusting to information both about their own markets and, in the case of the closed-end fund investor, about the foreign market. Extending the 'information explanation' of Froot and Ramadorai (2008) we argue that investors both at home and abroad respond positively (negatively) to the information conveyed by increases (decreases) in foreign market openness and that this affects both the country fund NAV return and in turn the share price return.

Our paper further contributes by applying a time-varying measure for market segmentation. This approach has been used in different contexts (Kearney & Lucey, 2004). Our approach is consistent with the arguments of Bekaert and Harvey (1995), who find that the liberalisation of equity markets is not a once-for-all occurrence. We use a time varying measure that indicates the proportion of the market that is

[1] A premium results when the share price is above the NAV, and a discount (negative premium) occurs when the share price is below the NAV. Here we use one term 'premium' to refer to both positive and negative premiums (discounts).

inaccessible to foreigners.[2] This measure has been found more recently by Bekaert et al. (2011) to be 'the single most important economic explanatory variable, accounting for the largest share of the explained segmentation variance' (p3877) in their study of market segmentation. de Jong & de Roon (2005) use a similar measure. Finally, we are also able to consider the impact of financial crises on investment barriers and pricing as our post-liberalisation time frame captures two major financial crises, the 1997 East Asian crisis and the 2008 financial crisis.

We hypothesise that increasing market segmentation affects closed-end country fund pricing in two ways. First, the value of the underlying assets decreases as local investors absorb the negative information being sent out by their markets. This results in a drop in the NAV. For a brief period there can be very high premiums (consistent with Chandar and Patro, 2000; Frankel and Schmukler, 2000) but then the stock price adjusts downwards as domestic investors react to the loss in value of the underlying assets.

We formulate the following hypotheses: Hypothesis 1: Direct investment barriers are negatively related to the closed-end fund stock price return. 2: Direct investment barriers are negatively related to the closed-end fund NAV return. 3: The closed-end fund premium is not significantly related to direct investment barriers.

[2] To our knowledge this measure has only been used as a control variable in one previous study of closed-end funds (see Chan, et al. 2008).

We collect monthly data from Datastream on the complete sample of seventeen UK traded closed-end country funds investing in single emerging markets[3] from 31 December 1993 to 31 December 2009. We define the closed-end fund premium, following Chan et al. (2008) as the difference between the natural log of the fund stock price and natural log of the NAV

$$PREM \equiv lnShareprice - lnNAV \quad (1)$$

Direct investment barriers

We use a time varying measure of investment restriction, the Edison and Warnock (EW) (2003) measure, to represent the level of capital control exercised by a country. This measure indicates the proportion of the stock market that is *inaccessible* to foreign investors. The scale for the EW measure ranges between 0 for an open market with no capital restrictions and 1 for a completely closed market.[4] We appreciate that a situation could occur in which the overall market value of the market has increased without the investable portion increasing, giving the impression that there has been a relative increase in market restrictions. However, we feel it is reasonable to assume that the market value of stocks available for foreigners to invest in, as these are usually major companies and therefore likely to be among the most liquid, will increase along with the remainder of the market, and therefore the ratio will remain fairly constant.

Indirect investment barriers

[3] Generally the funds invest across the country stock market, except Sri Lanka where most of the fund was invested in tea plantations. The Israel Fund and Brazilian Investment Trust had to be excluded from the sample due to insufficient data.

[4] In November 2008 the S&P IFCG indices were continued as the new S&P Global BMI series and the S&P IFCI indices tightened their criteria to include only the most liquid stocks (those with a float-adjusted market capitalization of at least US$ 200m with a minimum value traded of $100m in the previous year, up from market capitalization of $100m and turnover of $50m since 1994).

Following Nishiotis (2004) we also examine the following three indirect investment barriers – illiquidity, inflation and lack of economic freedom on the stock price, NAV and premium. Others have also found a significant relation between political risk and pricing in emerging markets (Dimic, Orlov and Piljak, 2015). We adapt the Amihud (2002) illiquidity measure to proxy the monthly illiquidity of the foreign market:

$$CILLIQ_{c,t} = \sum_{d=1}^{Dt} |R_{c,d}| / VOL_{c,d} \quad (3)$$

where $CILLIQ_{c,t}$ is the illiquidity of market *c* at time *t*. The daily absolute return and daily sterling volume of country equity index *c* on day *d* are given by $R_{c,d}$ and $VOL_{c,d}$. We calculate the sterling volume of trading by multiplying the number of stocks traded, reported in thousands, by the price in sterling. We then aggregate these daily figures to give the monthly absolute return, which is divided by the monthly volume of trading in thousands of stocks and scaled by 10^3. Inflation variability *(VINFL)* is proxied by the standard deviation of the monthly inflation rate from the IMF International Financial Statistics using a 3 year rolling period ending in month *t* (Nishiotis, 2004). We use the Economic Freedom of the World Index (Gwartney and Lawson, 2013) (Fraser Institute) measure to proxy for indirect barriers to economic freedom.. The index provides a rating out of 10 for the economic freedom and we then subtract it from 10 to give a measure of the lack of economic freedom, or the economic freedom barrier (EFB).

2. Results

We begin by testing for a relation between the components of fund premium, i.e. the stock price and NAV, and the direct and indirect capital control barriers as shown below:

$$SPRET_{f,c,t} = \alpha_f + \beta_1 EW_{c,t} + \beta_2 CILLIQ_{c,t} + \beta_3 EFB_{c,t} + \beta_4 VINFL_{c,t} + \beta_5 UKMKT_t + \beta_6 UKPREM_t + u_{f,c,t} \quad (4)$$

where $SPRET_{f,c,t}$ is the return on the stock price of fund f from market c at time t, α_f is the fixed effects parameter, *EW* is the Edison and Warnock (2003) measure of capital control, *CILLIQ* is the country illiquidity measure, *EFB* is the economic freedom barrier measure, *VINFL* is the variability of the inflation, *UKMKT* is the UK market return and *UKPREM* is the arithmetic average of the discount of UK funds investing in the UK. We use a fixed effects technique where each fund is allowed to have a fixed constant (α_f) to take account of the heterogeneity in the funds.

Insert Table 1 here

3. Discussion

In Table 1 Panel A all specifications show a significantly negative relation (at 1% level of significance) between the fund stock price return and the level of capital control regardless of which indirect barrier is included. The relation is still significantly negative in the presence of the control variables (UKMKT and UKPREM). The results for the direct investment barrier are consistent with our information hypothesis, which is that in the post-liberalisation period, investors react negatively to the information conveyed by an increase in market inaccessibility.

Table 1 Panel B shows that the NAV return, like the stock price return, is also strongly negatively related to the direct investment barriers (EW). This gives support

to our second hypothesis – that direct investment barriers are negatively related to the NAV return. We argue that when there is an increase in the EW measure (in other words when the value of the market accessible to foreigners decreases in relation to the entire country market) the market value of the assets the fund has invested in decreases, causing the NAV to decrease. As mentioned above, as the measure is a ratio measure we can envisage a situation where the overall market increases in market value, but the restrictions are unchanged. However, we assume that the *market value* of the investable portion of the market will generally increase along with the inaccessible portion of the market. In crisis periods this may not occur and we consider these below.

Table 1 Panel C presents the results of the regression of the closed-end fund premium with direct and indirect investment barriers. The results provide general support for our third hypothesis that in the post-liberalisation period, as there is no consistent relation between the premium and direct investment barriers. Our findings support those of Patro (2005) who finds that the announcement of loosening of investment restrictions has a positive effect on the closed-end fund net asset value, but no significant effect on the closed-end premium, as the price adjusts to the NAV. Our results are also compatible with the concept of temporary premium fluctuation due to sources of investor sentiment such as trades driven by foreign news events as in Klibanoff, Lamont and Wizman (1998); Hwang (2011). Andriosopoulos, Stelarios and Thomas (2014) also document the role of attention driven trades on the UK closed-end fund premium.

We then regress the share price and NAV return for each fund against the *change* in the level of the EW measure. We include the control variables, this time

using the change in the UK market index and the change in the average UK domestic premium. In this way we test to see whether our previous results may be due to autocorrelation. We find that there is a significant relation between the share price return and change in EW measure for 5 out of 17 funds (at 5% or 1%) and between NAV return and change in EW measure for an additional 2 funds as well as the same 5 funds (at 1%, 5% and 10%). (Results not reported).

3.1 Robustness checks

3.1.1 Robustness to control variables

We add a more extensive set of control variables to the regressions from Table 1. These include the foreign exchange appreciation rate, foreign market return and log of market value as well as the UK market return and the UK average premium. The tests with the additional control variables (not reported) do not change our main result i.e. a significantly negative relation between direct investment barriers (EW) and stock price/NAV.

It could be argued that our results are driven by the fact that our sample period includes two major crisis periods. Following the global financial crisis there were also changes to the S&P indices on which the Edison & Warnock (2003) measure is based. For this reason we rerun the tests for Table 1 using dummy variables for the East Asian Crisis in 1997-98, the Global Financial Crisis in 2007-2008 and for the period following the index adjustment from November 2008 onwards. Although we find significant dummy variables for the crisis periods, the results (not reported) are consistent with those of Table 1.

3.1.2 Alternative segmentation measures - covariance with world market return

It could also be argued that our results are dependent on the measure of segmentation we used and that another measure might produce a different result. For this reason, we rerun the same panel data regressions, this time using the 24 month rolling covariance between the returns of the emerging market invested in by the fund and the world market return, a measure used by Nishiotis (2004).

Insert Table 2 here

Table 2 shows that the level of covariance between the emerging market invested in by the fund and the world market (RCOV) is significantly positively related to the stock price return of emerging market closed-end funds in every case. This shows that the greater the level of integration, the higher the return on the fund.

3.1.3 Alternative segmentation measures - Lane Milesi-Ferretti measure

For further robustness we use the updated (2013) TOTAL measure: (Lane & Milesi-Ferretti, 2007, 2013). The TOTAL measure represents the ratio of the country's aggregate assets plus total liabilities to its gross domestic product. The issue with this measure is that it relates net foreign assets to GDP. We expect that as a country develops and becomes more open, foreigners increasingly invest in it and its foreign assets increase relative to its GDP. However, as it develops, the country can also be in a position to borrow more, and so the foreign liabilities will also increase, thus the two measures work in opposite directions. An alternative is to take two separate measures: the total foreign assets in relation to GDP and total foreign liabilities in relation to GDP. We regress fund stock price return, NAV return and premium first against TFA/GDP and then against TFL/GDP in Table 3. The results show a consistently significant relation between the fund and NAV return and both measures of country openness. This supports our previous findings that the fund and

NAV return are significantly related to measures of country openness. The more (less) open a country becomes, the higher (lower) is the fund (NAV) return of the corresponding closed-end country fund. In wider terms this gives support to the information hypothesis that investors respond positively to the information conveyed by greater market openness and that this is reflected in the pricing of the closed-end country fund.

Insert Table 3 here

5. Conclusion

In this paper we find that direct measures of capital market segmentation are significantly negatively related to both country fund stock return and NAV return. The lower the level of capital control and the higher the level of integration, the higher the stock price and NAV return of UK closed-end funds in emerging markets. Our results support an information hypothesis, whereby investors are responding positively (negatively) to increases (decreases) in market accessibility. This points the way towards a richer understanding of the closed-end fund premium – examined less as an isolated puzzle and more as the fluctuating relation between the expectations of the domestic and foreign investor as they respond to changes in information.

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Table 1: Panel Regression of Country Fund Stock Price Return, NAV Return and Premium with Direct and Indirect Investment Barriers

Panel A: Stock price and Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
EW	-0.059	-0.058	-0.062	-0.060	-0.064	-0.060	-0.067
	(-6.03)**	(-5.94)**	(-5.65)**	(-6.20)**	(-5.75)**	(-4.86)**	(-4.62)**
CILLIQ		-0.000	-0.004				
		(-0.30)	(-0.27)				
VINFL				0.000	0.000		
				(18.61)**	(12.82)**		
EFB						0.004	0.005
						(0.77)	(0.67)
UKMKT			0.130		0.130		0.013
			(13.73)**		(14.51)**		(14.54)**
UKPREM			0.001		0.000		0.000
			(0.06)		(0.19)		(0.35)
R-Sq	0.01	0.01	0.25	0.01	0.26	0.01	0.26
No. of Observations	1814	1728	1728	1814	1814	1814	1814

Panel B - NAV Return and Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
EW	-0.05	-0.52	-0.057	-0.054	-0.058	-0.06	-0.066
	(-6.18)**	(-6.21)**	(-5.31)**	(-6.47)**	(-5.44)**	(-5.43)**	(-5.01)**
CILLIQ		-0.001	-0.001				
		(-0.32)	(-0.32)				
VINFL				0.000	0.000		
				(18.42)**	(12.60)**		
EFB						0.010	0.010
						(1.68)	(1.50)
UKMKT			0.011		0.011		0.011
			(14.20)**		(15.14)**		(15.14)**
UKPREM			0.000		0.001		0.001
			(0.57)		(0.72)		(0.72)
R-Sq	0.01	0.02	0.23	0.02	0.23	0.02	0.23
No. of Observations	1797	1711	1711	1797	1797	1797	1797

Panel C - Premium and Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
EW	-0.14	-0.02	-0.07	-0.02	-0.07	0.016	-0.33
	(-0.19)	(-0.32)	(-0.95)	(-0.27)	(-0.97)	(0.2)	(-0.42)
CILLIQ		0.004	0.003				
		(0.97)	(0.77)				
VINFL				0.000	0.001		
				(8.06)**	(4.11)**		
EFB						-0.41	-0.04
						(-1.30)	(-1.39)
UKMKT			0.002		0.002		0.002
			(1.81)		(2.01)		(1.93)
UKPREM			0.008		0.008		0.009
			(2.49)*		(2.65)*		(2.94)**
R-Sq	0.01	0.01	0.07	0.02	0.08	0.015	0.09
No. of Observations	1644	1572	1572	1644	1644	1644	1644

This table reports coefficient estimates from regressions of closed-end fund stock price return, NAV (Net Asset Value) return and closed end fund premium on direct and indirect investment barriers and various control variables.

Table 2: Panel Regression of Country Fund Stock Price Return, NAV Return and Premium with World Market Covariance and Indirect Investment Barriers

	Panel A: Stock Price Return			Panel B: NAV Return			Panel C: Premium		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
RCOV	5.00	4.63	4.33	4.99	4.59	4.51	0.15	0.89	-0.63
	(2.88)*	(2.83)*	(2.53)*	(3.03)**	(3.20)**	(2.90)*	(0.04)	(0.24)	(-0.17)
CILLIQ	-0.04			-0.04			0.07		
	(-5.77)**			(-6.33)**			(5.15)**		
VINFL		-0.00			-0.00			0.01	
		(-0.39)			(-0.52)			(0.76)	
EFB			-0.01			-0.00			-0.06
			(-1.22)			(-0.26)			(-2.55)*
UKMKT	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
	(10.36)**	(10.79)**	(10.78)**	(10.35)**	(10.88)**	(10.83)**	(2.29)*	(1.77)	(1.82)
UKPREM	-0.00	-0.00	-0.00	0.00	0.00	-0.00	0.01	0.01	0.01
	(-0.07)	(-0.42)	(-0.32)	(0.56)	(0.79)	(-0.30)	(2.63)*	(2.69)*	(2.75)*
R-Sq	0.25	0.24	0.24	0.23	0.22	0.21	0.10	0.07	0.09
No. of Observations	1749	1767	1767	1732	1750	1750	1593	1597	1597

This table reports coefficient estimates from regressions of closed-end fund stock price return, NAV return and premium on world market covariance, indirect investment barriers and various control variables.

Table 3: Panel Regression of Country Fund Stock Price Return, NAV Return and Premium with Lane Milesi-Ferreti Market Openness Measure

	Panel A: Stock Price Return				Panel B: NAV Return				Panel C: Premium			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
TFA/GDP	1.25	0.98			1.15	0.99			0.10	0.23		
	(4.01)**	(3.05)**			(3.35)**	(2.67)*			1.54	2.97**		
TFL/GDP			0.87	0.70			0.92	0.82			0.09	0.17
			(2.40)*	(2.01)*			(2.75)*	(2.48)*			1.83	(3.72)**
UKMKT		-0.00		-0.01		-0.00		-0.00		0.00		0.00
		(-1.70)		(-3.72)**		(-0.93)		(-2.88)*		(1.52)		(1.06)
UKPREM		-0.02		-0.02		-0.01		-0.01		0.01		0.01
		(-2.31)*		(-2.38)*		(-1.58)		(-1.46)		(2.40)*		(2.62)*
No. of Observations	161	161	161	161	163	163	163	163	153	153	153	153
R-Sq	0.13	0.15	0.11	0.15	0.11	0.12	0.12	0.14	0.02	0.11	0.02	0.12

This table reports coefficient estimates from regressions of closed-end fund stock price return, NAV return and premium on the two components of the Lane Milesi-Ferreti Openness Measure.